Food Resilience Through Root and Tuber Crops in Upland and Coastal Communities of the Asia-Pacific
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Addressing the Economic and Health Challenges Facing Smallholder Communities through Roots and Tubers in Maluku and Maluku Utara, Indonesia

Results of a Scoping Study

Indonesia's rapid population growth threatens the country's food security. At the national average, food demand is greater than food supply (Handewi et al., 2008), partly because the land allocated for food production is limited. The country's 9.55 million farming households have small lands to cultivate (<0.5 ha), while land fragmentation, conversion and incentives for non-agricultural businesses further reduce land for food crops.

Root and tuber crops (RTCs), particularly cassava and sweetpotato, are one of the staple sources of carbohydrates among Indonesians in the past. But due to government programs that prioritize rice over other food crops, the consumption and value of rice have increased in the 1960's, thereby reducing that of cassava and sweetpotato. Policies related to food security also mention rice first and RTCs have been relegated to being a secondary carbohydrate source and its consumption indicating lower social status.

Despite these, many poor farmers in Indonesia continue to plant RTCs mostly for their own consumption. In some rural areas, idle lands are utilized by self-help groups (SHGs) to produce cassava and sweetpotato. Farmers also depend on cassava and sweetpotato during emergency situations such as flooding, since they are proven to survive extreme events.

Recognizing the potential role of RTCs in contributing to Indonesia's food security, FoodSTART+ and the Smallholder Livelihood Development Project (SOLID) conducted a scoping study with the goal of developing and validating partnership strategies towards promoting RTCs.

Research Highlights:

- Cassava and sweetpotato production fluctuates, but consumption is stable. Cassava is processed into a range of products and the leaves are an important vegetable. Sweetpotato is consumed fresh, but not the leaves.
- The SOLID areas are experiencing the effects of climate change, including uncertain rainfall patterns and drought. Cassava and sweet potato are more resilient than vegetables.
- Inclusive value chain development, including small-scale technologies, could assist smallholder farmers to overcome current post-harvest challenges.
- Cassava and sweet potato are not government priority crops, but are important for food security and fit with ongoing campaigns to reduce rice consumption.

Research Site Description

The SOLID project aims to improve the livelihood of 49,500 beneficiaries in 11 districts between two provinces: Maluku and Maluku Utara in Indonesia.

Both Maluku (1.82%) and Maluku Utara (2.21%) had annual population growth rates higher than the national average (1.4%) in 2010-2014. From 2015 to 2025, population is projected to increase from 1.7 million to 2 million in Maluku and 1.2 million to 1.4 million in Maluku Utara (BPS[1], 2016). The high population growth rates underline the need to urgently address food security issues. In fact, some areas are already experiencing cereal deficits.

Agriculture is the main livelihood in both provinces and is considered to be the mobilizer of the economy with a 37.7% contribution to the gross regional domestic product, the highest among all sectors. However; limited land, inadequate infrastructure, low levels of education, and lack of access to markets, financing, and alternative income sources; all contribute to the high poverty incidence in the provinces. In September 2012, 21% of the population in Maluku and 8% in Maluku Utara are living below the poverty line (BPS[2], 2016).

Both provinces have similar characteristics classified as volcanic, with a mountainous and undulating topography. The dominant soil types and climate are very suitable for growing crops such as cocoa, nutmeg, coconut, annual food crops (rice, cassava, etc.), and vegetables. However, many regions in Indonesia are already experiencing climate change impacts that affect the productivity of their crops, for example significant reductions in rainfall occurred in 1992-2003 (Handewi et al., 2008).

About FoodSTART+

Food Resilience Through Root and Tuber Crops in Upland and Coastal Communities of the Asia-Pacific (FoodSTART+) is a three-year project (2015-2018) that builds on and expands the scope of the concluded IFAD-supported Food Security Through Asian Root and Tuber Crops (FoodSTART) project. It is coordinated by the International Potato Center (CIP) and implemented in collaboration with the International Center for Tropical Agriculture (CIAT) in Asia. The project is also working closely with the CGIAR Research Program on Roots, Tubers and Bananas (RTB), and the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). It is funded by the International Fund for Agricultural Development (IFAD) and the European Union (EU).

The project aims to enhance food resilience among poor households in upland and coastal communities of the Asia-Pacific region through introducing root and tuber crops (RTCs) innovations. To achieve this goal at scale, the project develops, validates and implements effective partnership strategies with IFAD investment projects to promote RTCs for food security.

The project's key components are:

1. Project start-up and scoping studies including mapping on food vulnerability of RTC production and use;
2. Research for development (R4D) partnership development;
3. Needs and opportunities analysis on gender sensitive RTC innovations;
4. R4D action planning and launching; and
5. Documentation and knowledge products development.

The first series of FoodSTART+ Research Briefs features the results of the country scoping studies under Component 1. They present an in-depth look at the RTC production trends, vulnerabilities and opportunities in the target countries. The scoping studies were conducted during the first year of project implementation.

CIP International Potato Center – A CGIAR Research Center
CIAT International Center for Tropical Agriculture – Since 1967 / Science to cultivate change
CGIAR Research Program on Roots, Tubers and Bananas
IFAD – Investing in rural people
European Commission

Scoping Study Highlights

Production, area, and yield. Cassava and sweetpotato are the most commonly produced and consumed RTCs in Maluku and Maluku Utara. Since it is considered as a low maintenance and highly adaptable crop by farmers and a priority food crop by some districts; cassava production, area, and yield are significantly higher than sweetpotato, but yearly production trends appear to be erratic (Fig. 1). Area harvested with cassava also decreased between 2004 and 2015, from 7,271 ha to 4,842 ha in Maluku and 11,937 ha to 5,556 ha in Maluku Utara. As for sweetpotato, production appears to be stagnant, with a slight decrease towards 2015 in Maluku Utara and increase in Maluku. For both RTCs, productivity is slowly improving.

Conversely, potato is cultivated only in a few areas in Maluku; while taro, elephant foot yam, purple yam, and lesser yam are available but not intensively cultivated.

Crop utilization patterns and trends. In Maluku Utara, people used to consume cassava more frequently, while rice was consumed only about once a week. Since priority was given to rice in the country's food security policy in the 1960s, RTCs became second priority even though they are widely available. In 2011, the consumption of rice was about 10 times that of cassava. In both provinces, cassava and other RTCs are considered a poor man's food.

Postharvest, processing, and marketing. Cassava is mostly supplied to houses and small-scale industries to produce a range of traditional products such as cassava cookies (called *sagu lempeng* or *enbal*). Cassava drying is still done using traditional methods, which is unreliable especially during the wet season. As for sweetpotato, boiling or frying is common at the household level. In some areas under the SOLID project, RTCs are processed into end products for selling, such as cassava or taro chips.

RTC production and marketing in the sites have few actors in the value chain, formed mainly by farmers who sell to traders in traditional markets, to middlemen, or directly to consumers or home industry.

Constraints and Opportunities

Shift in diets

- In the past, carbohydrate food sources shifted from locally produced crops such as RTCs to rice and other food items that are more flavorful and convenient such as baked products and noodles.
- Even after being declared as a staple food, rice supply is still limited due to the lack of local capacity to meet the demand and challenges in importation. Therefore, the government changed its strategy by going back to the optimization of local food products and enacted laws to encourage food diversification using locally sourced food.

Climate Change and natural disasters

- Cassava and sweetpotato are proven to be climate-resilient and adaptable crops, often consumed in times of disasters or when rice is unavailable.
- Improved production systems are needed to ensure sustainability and resilience in the face of climate change.

Changing gender roles and perspectives

- In the project sites, both men and women do agricultural work. For RTCs, men are more involved in harvesting and marketing while women take charge of the post-harvest and processing into food items such as cakes from cassava starch, chips, and crackers, which are then sold to consumers.
- The gradual formation of the SHGs by the SOLID project provided a venue for women involvement in the sites.

Food security and nutrition

- Present supply for food staples such as rice remains insufficient, thus resulting to food insecurity in the project sites.
- Cassava and sweetpotato are locally and readily available alternative carbohydrate sources, but there is limited awareness to its nutrient and health values.

Challenges according to farmers

- Preservation and value-adding post-harvest processes are severely limited due to lack of knowledge among farmers.
- Marketing challenges include limited market options and lack of road infrastructure and transport facilities.
- Prices dictated by middlemen or retailers are often low.

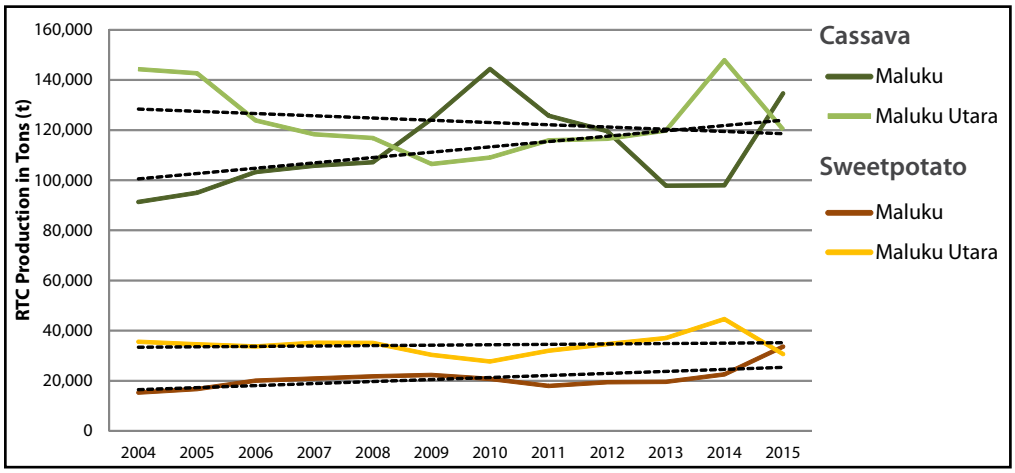

Figure 1. RTC production trends in Maluku and Maluku Utara from 2004-2015 (BPS[3], 2016)

Conclusions and Recommendations

RTCs have good potential in addressing recent food diversification efforts that consider local sources, especially since they are already being produced in many areas in Maluku and Maluku Utara. This endeavor can benefit from activities that **create awareness on alternative diets** among the public, as well as **research in improving the economic and nutrient profile of RTCs**.

Sustainable RTC production can be achieved with the **identification of high-quality varieties** that are more climate-adaptive and have potential for diversification (phenotypic diversity, availability, and nutritional content).

Poor road infrastructure and lack of postharvest facilities resulted to reduced quality and value, making farmers lose interest in growing RTCs. Improvements in these areas are needed, complemented by **market studies that could identify potential markets and facilitate partnerships** to strengthen RTC production.

Political support through policy formulations is also key to getting more farmers on board, as well as action at all levels to improve utilization of local food, especially RTCs.

Promotion of RTCs for food and nutrition security and income generation can be done through **capacity building and knowledge transfer activities** in the project sites.

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